

Scissor Thrust Valve Actuator

Battelle Energy Alliance LLC (BEA) has developed a scissor thrust valve actuator that incorporates a radically new electrically, pneumatically, or hydraulically power-operated mechanism to open, close, and reposition valves from remote locations. Output capabilities optimize thrust with demands for repositioning valves and results in a dramatic reduction in power consumption. Design features reduce operation and maintenance costs associated with similar equipment while simultaneously providing critical valve and actuator operations.

The Design

BEA's simplified design does not require special castings and machining inherent in existing actuator designs; will be very economical to manufacture; is easy to install; and setup and control is much simpler and precise. The new design is smaller than existing actuators and requires much less power to perform similar function. Its inherent ability to monitor critical valve and actuator parameters remotely allows precise control and increases

actuator reliability.

The Problem

BEA's scissor thrust actuator addresses power-operated valve problems in one of the most common safety-related components found in commercial plants. Existing motor-operated valve actuator designs contain serious operation and control problems inherent in their design. To address these problems, regulators require operators to frequently and rigorously test and adjust their motor-operated valves. This testing is time consuming and very expensive.

Torque generation and control are problems associated with all motor-operated valve actuators. Conversion of actuator torque to valve thrust is outside the control of current actuator design and is very difficult to measure and trend over the component's life. Conversion of torque to thrust assumptions are required which typically results in large uncertainties that must be incorporated into actuator design and setup. This mismatch between torque producing actuators

and valve thrust requirements has made the industry highly dependent upon costly tests with expensive diagnostic tools and extensive use of engineering analysis.

The Benefits

BEA's innovative solution is based on a radically different actuator design and delivers very large stem thrusts during the valve cycle when maximum thrust is required. Matching actuator output to valve demand greatly reduces actuator power requirements. Actuator sensors precisely measure output parameters needed to understand and verify actuator operation, health, and reliability.

Potential scissor thrust actuator applications exist wherever power-operated valves are utilized. One immediate benefit of this technology would be elimination of economic, regulatory, and safety problems inherent with existing actuators.

Improvements in valve/actuator reliability, integrity, and overall system infrastructure

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security would be realized by adoption of this new valve actuator technology. These improvements also address concerns within the gas and petroleum transmission and distribution industries and would improve the ability to remotely control and diagnose system operation and upgrade aging components with simpler and more reliable components. Infrastructure security would be enhanced by an improved capability to reliably respond to accidents or malevolent attacks by quickly isolating portions of transmission or distribution piping systems as necessary.

Scissor thrust actuator design features also benefit other industries, such as the chemical, non-nuclear power, and the gas and petroleum industries. Monitoring valve and actuator reliability, and precision control capabilities, make this design ideal for remote valve applications, such as offshore oil drilling.

Partnering with INL

The INL is soliciting interest from qualified industrial firms interested in participating in projects and commercializing this technology. The INL has a patent issued (see patent no. 7,097,148 B2) on the

process, which may be licensed exclusively or non-exclusively. The INL invites interested parties to contact us regarding the details of licensing and implementing this technology into an operation.

